The Economic Contribution of Agriculture in Delaware: Reply

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Using final demand as the impact variable is admittedly the original intent of input-output analysis. However, to account fully for the output of a particular industry using this approach, one would need to identify all other industries that would have production links to the industry. This can be a rather tedious process, especially with an industry with many interindustry connections in a detailed input-output table. In our paper, the use of output as the impact variable circumvents this identification process by simply using the output data of the industry or industries being analyzed. These data are available for agricultural and manufacturing industries and are more accurate than final demand data.

Noting the double counting that would result with the use of output as the impact variable, the regional purchase coefficients (RPCs) of the industries being analyzed are set to zero. Setting the RPCs of these industries to zero effectively prevents other local industries from buying from them. This means that in the impact analysis with output as the impact variable, the total impact of an industry will exclude any additional output requirements for the industry coming from the direct, indirect, and induced effects of the original output. For example, in analyzing the contribution of agriculture in an economy with three sectors—agriculture, manufacturing, and services—with total agricultural output as the impact variable and agriculture's RPC set to zero, the total output multiplier for agriculture (column sum of elements in the $(\mathbf{I} - \mathbf{A})^{-1}$ matrix for agriculture) will definitely be greater than 1. It includes the original output of agriculture as specified in the impact analysis plus the direct, indirect, and induced effects of and on the output required from manufacturing and services. Since all sectors (manufacturing, services, and agriculture itself) are prevented from buying from agriculture, no additional output is required from agriculture. The total economy-wide output multiplier, however, fully accounts for agriculture's output without double counting and at the same time includes the direct, indirect, and induced output effects required from manufacturing and services. The only output effect from agriculture itself will be the original output.

In the case where the RPCs of *all* three sectors are set to zero, the total output multiplier of each sector will be 1. This is clear in IMPLAN, where the direct coefficients matrix (**A**) is derived by multiplying the regional market share matrix by the regional absorption matrix. When the RPCs of all sectors are set to zero, the regional absorption matrix is a null matrix. This makes **A** a null matrix as well. The resulting multiplier matrix is simply $(\mathbf{I} - \mathbf{A})^{-1} = (\mathbf{I} - \mathbf{\emptyset})^{-1} = \mathbf{I}$. In this case, the total output multipliers for each sector are equal to 1 and are consistent with the original output totals. However, by setting only the agriculture RPC to zero, the **A** matrix elements will not all be zero. This leads to a total economy-wide output multiplier for agriculture that is greater than 1 with no double counting of the output of agriculture.

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References

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